Exchanges between research organisations in the field of industrial risk

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EXCHANGES BETWEEN RESEARCH ORGANISATIONS IN THE FIELD OF INDUSTRIAL RISK

Uncerrtified Translation

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Since the beginning of the twentieth century, coal mines research institutes have had cooperation in accident prevention and emergency responses in case of catastrophic events. Therefore, it was possible to decrease the number of accidents and the extent of effects. The acquired experience was exchanged during meetings of directors and of experts of Research Institutes.

Mainly owing to the diminution of the number of coal mines, these institutes evolved to become more involved in other fields such as chemistry, oil, metallurgy, agro and food industries where the effects of accidents could be catastrophic. Accidental phenomena, in which these institutes are working, are emissions in air, releases in soil and water, fires and explosions.

After a brief introduction on INERIS, lessons learnt from cooperation between the Central Mining Institute - CMI -, Katowice, Poland, INERIS and the Research Mining Institute - RMI - Ostrava-Radvanice, Czech Republic, will be dealt with. First in coal mine field and then in other industries, such various aspects as prevention and investigation of accidents, knowledge dissemination through technical papers, courses and guidance books for users and exchanges of technical information during experts meeting will be considered. Development proposals will be also mentioned. Needs in industrial risk assessment in Central and Eastern Europe will be dealt with. Finally, suggestion will be given on how to improve the organisation and coordination of the assistance programmes.

PRESENTATION OF INERIS (INSTITUT NATIONAL DE L'ENVIRONNEMENT INDUSTRIEL ET DES RISQUES), FRANCE

INERIS, created at the end of 1990, is a research and consultancy public organisation. This Institute results from the merging of two organisations : CERCHAR and IRCHA. About 400 people are working at INERIS.

As a public organisation, mainly involved in France and European countries, INERIS has an expertise in Industrial Safety and Environment. The proposed services are mainly based on the experience gained through the work performed for the French Ministries of Environment, Health, Industry, Interior, Labour and Transportation and Equipment and Regional Directorates for Industry, Research and Environment. It carried out also lots of work for insurance companies and industrial firms. They are related mainly to petrochemical industries and refineries, mines, metallurgical, chemical, polymer, agricultural and food processing industries.

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(1) The ideas and opinions expressed in this document are those of the author at the time of the meeting and do not commit the French Public Authorities.

In the field of the hazard identification and risk assessment, INERIS got a recognized experience on phenomenons of fire, explosion and emission in air through experimental tests, modelling and investigations of accidents (1). Funding is mainly given by French organisations but also at European level (STEP, Prenormative Research for the Bureau Communautaire de Reference, Copernicus, EUREKA, BRITE EURAM programmes).

A long term work is devoted to evaluation of commercially available softwares dealing with the assessment of the effects of major industrial hazards (2). INERIS is also a member of the Model Evaluation group (Directorate 12 of Commission of European Communities).

In 1990, the author was chosen as an OECD Consultant for a workshop held on Emergency preparedness and response and wrote the document referenced under 3. INERIS is regularly involved in safety cases (and their critical analysis) for the above mentioned industries.

Finally, INERIS has a long experience in the development and use of sensors for toxic and flammable gases in the atmosphere.

COOPERATION IN MINE FIELD

International meetings on safety in coal mines were held, on a regular basis (every two years), since 1931 at the director's of Research organisations level. These meetings were firstly devoted to mining explosives, flame-proof electrical machinery and explosion risk. Then the covered field was extended to the prediction of methane emission and environmental monitoring, to respirable dust, to diesel engines and to the reliability of systems and formal methods for assessment of safety and reliability.

In the risk field, experts meet every year on safety problems arising from mining explosives uses and means to fight the explosion effects. In addition to CMI and INERIS experts, representatives of Belgium, Germany, Spain and United Kingdom are present.

A regular bilateral cooperation exists between CMI and INERIS for many years. For example, in order to avoid the effects of an explosion from pyrolysis gases in mine galleries when fires occur, it is possible to install physical foam barriers able to withstand such an explosion. For the definition of the installation rules for such devices, a joint experimental programme was carried out with a French foam at the CMI Experimental Mine Barbara. The results were analysed by teams of the two institutes and then applied to French mines by INERIS scientists.

Information exchanges on Mine Accidents and Regulations are also dealt with in experts meetings.

For modelling gas emission (air, nitrogen, methane) from coal seams, tests were carried out in the Polish Mine SZCZYGLOWICE in a face and goaf system. This mine was chosen because it was possible to change in a rather large domain the ventilation rate. The performed tests allowed to validate a model previously defined at INERIS. A tracer gas method was used in these experiments.

COOPERATION IN INDUSTRIAL FIELD

Cooperation between CMI and INERIS was until recently dealing with industries (agro and food processing, chemistry, metallurgy, oil...) in which combustible dusts are present and may induce fires and/or explosions.

Until mid 93, this cooperation involved the participation of experts of both organisations in conferences held every two years in Poland on Industrial dust explosions (6) (7) (8) and in courses given in France by INERIS for industrialists and insurers (9).

In 1992, for the COPERNICUS European call of proposals, CMI, INERIS and RMI defined and proposed a project dealing with a guidance book on fire and explosion protection in agro and food processing industries. This project was accepted and was initiated in January 94 for a 2 years period.

The first stage of this work is to share previous experience in accident analysis, research results and use of regulations. Various tasks concerning the types of facilities, the processed products, the competent authorities in charge of the regulation, the professional associations, the engineering societies and the collection of accident data are finished.

Three stages are experimental to get new knowledges, either at CMI (on two protection systems : triggered barriers and venting devices) or at RMI (fire risk in powdered material storages).

The last step will be issuing a guidance book defining Safety measures to be chosen when designing, building or managing a facility. This guide will be presented during technical seminars in the three countries.

Since end 1994, in a cooperation project financed by the French Foreign Affairs Ministry, INERIS is dealing with the use of a methodology for safety case as applied in France for plants in which major technological hazards exist. This work is the consequence of a previous one managed by the French Ministry of Environment on Administration Engineering in Czech Republic and Slovakia. In cooperation with the Regional Directorate of the Czech Ministry of Environment, the Economic Development Agency in Ostrava, a plant "Moravske Chemicke Zavody" in which ammonia is stored is concerned by a case study.

A joint Czech-French team was created. Until now, a training course by French partners was performed on the methodology to be used. The Czech partners will then use it for the case study. A critical analysis of the safety case will be done by the French partner. Finally, a joint methodology should be defined.

DEVELOPMENT PROPOSALS

A further step on cooperation between CMI and INERIS is proposed between 1995 and 1997 referring to scientific and technical cooperation between France and Poland. The objective will be the development of protection means on industrial risks particularly for mitigation of gas and dust explosions. This project is directly related to chemical, agro and food, fondries industries. Methodologies for risk assessment and measures to fight the effect of explosions and fires will be developed.

INERIS is also involved for some years in work done in European Safety and Reliability Data Association (ESReDA), the objective of which being the data share in safety, reliability and safe working conditions. For this association, INERIS convenes a working group on analysis of accidents in which dangerous substances are involved in chemical plant and in transport. In a first stage, this working group in which representatives of Finland, Germany, Italy, the Netherlands, Norway and United Kingdom are present, was looking through a questionnaire enquiry at strengths and weaknesses of existing date bases. The results were shared during an ESReDA internal seminar on accident analysis (10). Until now, this work was only dealing with Western Europe databases. In a new stage, to be undertaken in 1995, a Directory of Databases on accidents will be carried out and the integration of Central and Eastern Countries is a necessity. In order to harmonise the chemical risk assessment throughout Europe, harmonised data collection is a prerequisite for the development of common policy on prevention and emergency response.

INERIS is also a member of a consortium dealing with the EUREKA project MEMBRAIN, the objective of which is the development of a standard software integration platform to enhance the capability of Major Emergency Management decision makers. This project began end 1993 with Danish, Finnish French and Norwegian partners. End 1994, LODZ (Poland) voïvodship entered the consortium. The leading of the project is assumed by CAP GEMINI INNOVATION (FRANCE). INERIS has carried out a field research on how to choose reliable and dependable atmospheric sensors to look at the development of accidental scenarios in which flammable and toxic gases are involved. Again, this could be an opportunity to define a harmonised policy and means to manage chemical emergency situations (4).

NEEDS IN INDUSTRIAL RISK ASSESSMENT FOR EASTERN AND CENTRAL EUROPE COUNTRIES

The conclusions given here are based on a long-term, more than 20 years, but limited cooperation mainly with two research organisations in Poland and Czech Republic. Needs were identified respectively for competent authorities, industrial firms, research and consultancy organisations and organisations implied in emergency.

1) Competent authorities :

The Administration reorganisation and the willingness of countries in transition to be competitive in world markets impose, as a prerequisite, to make reference to a safety policy. A stepwise planning must be induced by competent authorities for applying European Directives and Standards related to prevention of chemical accidents (Seveso, Machine, potentially explosive atmospheres, construction materials, transportation of dangerous goods, chemical materials directives) and mandated CEN standardisation technical committees (TC 114, TC 305...) for application of directive requirements. Means for risk assessment in plants with major technological risks are to be defined and used. These means should be extended to all chemical plants.

Collection and Analysis of accident reports is also a mean to verify the fitness for purpose of the safety policy and to define where safety efforts have to be undertaken.

These authorities shall rely on teams active in developing knowledge in the field of risk assessment and accident investigations. These teams shall be involved in European Information exchange group on Directives and work in standardisation groups (CENELEC, CEN).

2) Industrial firms

For the development of the chemical sector, a new safety culture is to be considered for the countries in transition. The safety culture, the training of industrialists, the technical situation of the chemical field must be first analysed to define goals. Joint teams from developed an in transition countries need representatives of competent authorities in order to integrate the partnership concept. An evolution of a safety policy relies also on enough financial means for training people in charge of managing plant, and of designing, building and maintaining facilities. These actions have to be adapted in the various industrial domains and imply the participation of consultancy and engineering companies. This aspect could be illustrated by the above mentioned work performed in Ostrava region.

3) Research and Consultancy organisations

These organisations must be involved on a contract basis with industrialists and competent authorities for the definition of projects to increase knowledge. These projects must take into account the exact nature of chemical products and equipment, machine and facilities used. Technical guidance books or codes of practice are to be written jointly between interested parties. This work is complementary to the one devoted to the development of new directives and standards which have very broad objectives.

4) Organisations implied in emergencies

Tools to be used for planning and response emergencies are to be developed considering the current situation, the existing means and the necessary funding for personnel and equipment. Local teams have to be trained during exercises using real case conditions.

HOW TO IMPROVE THE ORGANISATION AND COORDINATION OF ASSISTANCE PROGRAMMES

Note : the conclusion are only based on lessons drawn from cooperation with two countries : Poland and Czech Republic.

Integrating the economy of countries in transition in world economy implies, as an important point, closer contacts with possible partners.

These contacts are to be promoted within various contexts : seminars, working groups on European regulation and standardisation, exchanges of people between competent authorities research organisations, consultancy organisations and industrial firms of involved countries. The philosophy of a network of partners is to be developed.

The success of projects in which INERIS was active, lies on longstanding contacts between such organisations as Central Mining Institute in Poland and Research Mining Institute in Czech Republic and on the long term common work. Considering the specific action related to safety case methodology for a chemical plant in Ostrava (CZ), the objective of training Czech partners has been reached owing to the fact that a previous regulatory approach was jointly performed by representatives of the Czech and French Ministries of Environment.

The success is also to be related to the financial support of industrialists and governmental and European organisations to the projects. Financial assessment fitted to projects on chemical accidents is to be developed during the discussion of projects ; the possible project leader must be aware of the distribution of various costs in the different countries.

In general, it must be emphasized that the effective development of programmes on chemical accidents is only possible when competent networks allowing regulatory, industrial and financial assessments are in place. A specific action must be focused on creating independent international clearing houses for assessment of projects.

Through this long term cooperation with Czech and Polish Research Organisations, INERIS was also in a position to get knowledge developed in both these countries and to apply it in France.

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